



Canadian Transport
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**The Socioeconomic Impact of
Grain Transport by Unit Train and other
Grain System Modernization**

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THE SOCIOECONOMIC IMPACT OF GRAIN TRANSPORT BY UNIT TRAIN
AND OTHER GRAIN SYSTEM MODERNIZATION

A Report to the Research Branch,
Canadian Transport Commission

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Table of Contents

Chapter I - Conceptualization	1
Overview of the Problem	1
"Not by Unit Trains Alone..." Four Sources of Efficiency Gain	5
(1) Unit Trains	7
(2) Branch Lines	11
(3) Elevator Consolidation	15
(4) Improvements in the Trucking Network	17
Transport Efficiency Capture -- The Deregulated U.S. Model	23
Public Choice Theory	31
The Principal Actors and Their Interests	35
New Rules: A Tentative Scheme	42
Initial Principles	42
Operational Rules	46
Some Further Notes on the Compensation Package	54
 Chapter II - Some Rough Statistical Magnitudes and Recommendations For Better Future Data	 63
The Kruger Unit Train Estimates	65
The High Cost Branch Line Study	66
The IBI Estimates	69
Canada/U.S. Comparisons	72
The Present State of the Numbers	73
The PHAER Model	76
Recommendations re Data-Generation through PHAER	79
 Chapter III - Conclusion	 85
 Appendix A - Substantive Terms of Reference	 87
 End-notes for Chapter One	 91
End-notes for Chapter Two	95
End-notes for Chapter Three	97
 Bibliography	 99

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Ultimate responsibility for the text, and particularly for its recommendations, rests, of course, with the author.

THE SOCIOECONOMIC IMPACT OF OTHER GRAIN SYSTEM MODERNIZATION

CHAPTER I - CONCEPTUALIZATION

"This study is concerned with establishing a methodological framework to evaluate the potential local, regional and national socioeconomic impacts of a transition in the handling of grain if it were to be transported to export gateways by unit train instead of the present (carload) system." (Excerpt from terms of reference) (1)

Overview of the Problem

The underlying purpose of the project as a whole is to investigate means by which Canada might achieve significant new economies in the overland transport of western grains (a product-group with which it is convenient for many purposes to associate canola and other western-grown oilseeds).

While the Canadian economy today is no longer as "grain-driven" as it was in the heady, developmental years of the Great Wheat Boom and the major settlement of the prairies (1896 to 1913, with something of a reprise from 1921 to 1929), this sector nevertheless remains of great importance to our overall prosperity. It is impossible to be precise, but if we take the

total grains and oilseeds sector, and add to it all the transport and other "forward linkages" occurring within Canada, we seem to be looking at something perhaps close to five per cent of total Gross Domestic Product. In very rough dollar terms, we might be looking at something close to \$14 billion in final demand of which something on the order of \$1 billion would be attributable to transport and handling costs between farm gate and export point. (2)

In terms of exports by value, sales abroad of agricultural products have in recent years amounted to 10 to 11 percent of all our merchandise exports. Within that agricultural grouping, grains, oilseeds and their products, primarily of western origin, have accounted for approximately 70 per cent of the group total.(3)

This is clearly still one of our great export industries and likely to remain so, despite recent set-backs such as the outbreak of grain subsidy warfare between the United States and Western Europe. One fairly recent overall assessment looks for further modest growth in the industry, subject to the important condition, "... that all actors in the grains sector -- from the farmers to governments -- will have to be extremely flexible to take advantage of market opportunities as they arise."(4) To this flexibility condition must be added another: close attention to efficiency of resource use in every phase of the process that begins with soil preparation and farm seeding, and ends with export shipment or final "domestic disappearance" of grain products into Canadian consumption.

All of which brings us, appropriately enough, to the matter of grain transport that is the immediate concern of this report. What gives the transport and related handling of grain within Canada a peculiarly great importance is that we have one of the longest, average overland hauls to market of any large grain-producing country. Distance, plus the difficult terrain encountered in the Cordillera to the west, and the Canadian Shield to the east, of the main producing area, make it a costly haul. Keeping this cost down to the minimal, state-of-the-art level must be one of our more significant economic preoccupations.

This is all the more true because we cannot now push very much of that cost forward on to our export customers. We might have done so earlier, between the Second World War and the 1960's, when the United States and Canada were dominant "price-makers" in world wheat markets, with Canada even acting as a price leader. Since then, however, the balance of market power has shifted towards importers.(5) This means that it is now Canadians who must bear most of the cost of moving export grain.

And following the passage in 1983 of the Western Grain Transportation Act (WGTA), the prospect is for a gradually increasing share of the cost to be borne, directly and obviously, by Canadians who are also western grain producers.(6) This can only sharpen their collective interest in improving the efficiency of the system that stores, handles and moves their product.

But as we shall see, the really difficult, central issue here is how to adjust the system parameters so that the collective interest emerges

also as an equally clear individual interest. It is not just a simple problem in rational persuasion. While lively demonstrations and similar forms of political communication, such as occurred prior to the passage of the WGTA, may well convey some flavour of irrationality to distant television-viewers, the more basic and generalized irrationality and tradition-worship sometimes attributed to western farmers by non-prairie Canadians (and even by some prairie non-farmers) have been much exaggerated. Given the system parameters as they stand, the skepticism and hesitancy of many individual producers towards broadly framed proposals to make further radical improvements in the grain transport system are entirely understandable. The reasonable questions, "But what, specifically would it mean to me and others in this immediate community? What, roughly, would be our cost/benefit numbers?" have often been asked, but not yet convincingly answered.

Later in this paper, an attempt will be made to sketch in some lines of approach to satisfactory answers. It is not the only such attempt now under way, and it will draw liberally in places upon the efforts of others. Good, eclectic solutions, much more than displays of blazing originality, are what are needed in this area today.

But first we must look at the four principal sources of potential further efficiencies in the transport of grain.

"Not by Unit Trains Alone..." Four Source of Efficiency Gain

With the passage of the WGTA, the overall movement of export grain once more became remunerative to the Canadian railways -- something it had not been for many years previously. Freight rates actually charged, plus the so-called "Crow benefit", were now set to produce an overall revenue appreciably in excess of the calculated variable cost of grain movement. This provided incentive for the railways to take a major first step in improving system efficiency: heavy new investment in the enlargement of main-line track capacity, especially westward through the erstwhile mountain bottleneck. It also caused them to channel new manpower and energy into the planning and marketing of their grain-hauling services.

But much more remains to be done in order to capture all the efficiency gains that modern transport and handling technology makes possible. A strong consensus to this effect runs through the responsible, scholarly literature of the subject (7). Several clauses of the WGTA itself clearly envisage what may be termed a "Phase II" of system efficiency improvement.

As the terms of reference of this study indicate, one important, potential Phase II improvement consists of greater use in railway grain haulage of the type of unit train technology that has already proven so successful in the movement of western potash and coal. For reasons to be detailed below, the specialized unit train is perhaps the best embodiment to date of one of the long-standing economic fortes of railways (and, we might well add, of North American railways in particular): the long-distance,

line-haul movement of large quantities of heavy commodities from single points of origin to single destinations.

But that specification of "single points of origin" immediately brings into the picture highly important considerations of branch lines, elevator consolidations, and the truck-transport of grain. Unlike potash or coal, grain is not produced in trainload quantities at a relatively limited number of sites. It is grown all over the southern and south-central prairies, and in the Peace River region. Assembling it into trainload quantities at suitable sites requires far more of an initial gathering function than in the case of potash and coal.

And when we look in turn at the above-mentioned elements in that gathering function (branch lines, elevators, trucks), we find not only that they must be substantially altered if any significant numbers of unit trains are to be run to Thunder Bay, Churchill and the Pacific Coast ports, but also, that in their own right they all offer still further opportunities to capture major cost-savings in the movement of grain beyond the farm gate. We could literally isolate pieces of the total system and achieve significant economies in those pieces only. Obviously, however, it would be still better, in such a highly interrelated system, to move forward in a more coordinated fashion, and so achieve a total, efficiency result greater than the sum of the parts. In actual practice, some degree of such synergy would be virtually bound to occur, even if it had not been particularly planned that way. Developments in U.S. grain transport since rail-rate deregulation, to be discussed later, well illustrate this.

In total, then, Phase II system improvement should involve a coordinated drive for greater efficiency in all of the following four respects:

- (1) Greater use of unit and "near-unit" trains in long-distance railway line-haul to export and domestic processing gateways;
- (2) Replacement of high-cost grain-gathering along low-volume, grain-dependent rail branch lines by lower-cost truck movement;
- (3) Acceleration of the already existing trend towards consolidation of country elevators into fewer, larger, faster-throughput and generally more efficient units;
- (4) Enlargement and modernization of the total truck fleet available for prairie grain-gathering, and achievement with it of much higher rates of capacity utilization and other cost-saving improvements.

Some explanatory comments are in order on each of these items.

(1) Unit Trains

Very strictly speaking, a true unit train consists of locomotives plus a number of specialized freight cars, dedicated to the carriage of a single commodity from point A to point B, and kept permanently coupled together. There is normally little or no backhaul of revenue freight from B

to A (i.e., most if not all cars make their return journey empty). But as in many other types of rail haulage today, such as rack-car transport of new automobiles, the disadvantage of this is more than offset by quick loading and unloading, plus other features making for a high rate of production of loaded tonne-kilometers per unit of time. Some unit trains can be unloaded "on the run" -- i.e., be voided of their contents while being moved slowly over the terminal unloading facility. For this purpose, the most efficient approach configuration is a "balloon track", shaped like the outline of its namesake.

Of great importance in boosting the rate of tonne-kilometer delivery is the fact that, being permanently coupled together, the train requires little or no time-consuming and costly switching. To take full advantage of this feature, however, there must be a fairly consistent maintenance of volume of product ready for shipment at the point or point-cluster of origin. Otherwise, there must be switching to vary the length of the train, or else in slack times the train must wait until there is enough volume to fill it.

It is not wise to become too rigidly attached to a particular, strict definition of a unit train, or to suppose that some trains which fall short of the definition in one or more respects are necessarily much less cost-effective. For example, a cycle by which a grain unit train moved a load from prairie point A to export point B, but then proceeded to prairie point C to pick up another B-destined load there, might be at least as cost-effective as a strict A-B-A-B-etc. sequence. Indeed, the ABC cycle might be

even better, if at times A did not have a full trainload on offer, whereas C did.

Nor must it be presumed that the more efficient future scenario need tend toward unit-train rail movements only, from main-line points only. One railway interviewee for this study postulated the case of a heavy-duty branch line, along which elevators had been consolidated into three high-throughput facilities, each capable of loading 30 hopper cars a day (moving the hopper cars into and out of loading position by means of a "Hi-Railer" mini-switcher, or by a moving cable and grip arrangement). If, he said, a train could proceed up the branch in the morning, setting out empties and picking up loaded cars at the three elevator locations, and could be back by evening with 90 loaded cars ready for main line despatch as a "solid" train to an export gateway, that could be a very cost-effective operation. Depending upon the length of the branch, more than three elevator locations might even be serviced; what appeared to be critical was that high-cost overnight layover of train and crew at the far end of the branch be avoided.

There seems little doubt that cost savings from unit train transport of grain could be significant. In a CTC study by J. Kruger, in which train-related variable costs only were considered, and in which 1980 costs of conventional train movement were compared with estimated 1980 costs of "potentially feasible" unit train services, an annual cost saving in the order of \$58 million, was calculated. Kruger characterizes this as a conservative estimate, inasmuch as further savings might be anticipated in line-related variable costs and capital costs not as yet included in the calculation. In connection with capital costs, some particularly striking

estimates by Kruger have implications for the possibilities of using grain hopper cars and other equipment far more intensively. Under the present, conventional system, it appears to take from 18 to 23 days, on average, for loaded grain cars to make their way from the prairies to Thunder Bay or the Pacific Coast. Under the projected unit train scenario, this would drop to between three and 4.8 days.(8)

Less direct but useful insights into unit train cost savings may be gained by examining single-car and multi-car grain rates quoted in 1983-84 by the Burlington Northern Railroad, a major U.S. practitioner of unit and solid train technology:

Table 1

Bismarck, N.D., to Seattle

(2,000 km., rates in U.S. dollars)

	<u>Single Car</u>	<u>26 Car Unit</u>	<u>52 Car Unit</u>
Cost/100 Wt.	\$ 2.21	\$ 1.99	\$ 1.84
Cost/Tonne	48.72	43.87	40.57
Cost/Tonne-km.	0.024	0.022	0.020

Source : see endnote 9

Compared with the single car rate, a discount of 10% was offered on the 26 car unit, and of 18% on the 52-car unit, "These discounts are presumably given for savings in switching costs incurred in picking up single cars at elevators and making cars up into trains and similar cost savings incurred in the ports." (9)

(2) Branch Lines

Perhaps the most impressive of all consensuses in the economic literature of Canadian grain transport concerns the superfluity of railway branch lines. Few now dispute that this superfluity is both great and costly in itself, in addition to being incompatible with maximum capture of the potential economies of unit-train operations.

Yet this is one of the most sensitive of all areas of system reform -- let the unwary be warned, and not rush in unprepared! Here, as the system stands, is the most striking single example of seeming contradiction between the interests of grain-producers collectively, and their perceived interests as individual producers and residents and taxpayers in local communities.

The present-day railway map of the southern and south-central prairie provinces still displays an impressive proliferation of railway lines of all kinds. Some are primary main lines; some secondary main lines (generally identifiable by length, and by carriage of significant quantities not only of grain, but of other commodities as well); and some branch lines, many of which now carry little or nothing but grain.(10)

Retrospectively, some experts now hold that even in terms of the technological circumstances of the time there was significant overbuilding of branch lines (11). All the same, given the state of the transportation art in the early twentieth century, a lot of lines would have had to be built in order to haul grain, general freight, passengers, mail and express by the then-predominant rail mode. One could almost say that much of the prairie

rail network and its associated pattern of towns and villages was constructed to a module of roughly nine miles. That was at once a convenient distance between clusters of passing track, station-cum-train-order-office, and elevators along single-track lines of railway, and half of a practicable, 18-mile, one-day return trip from farm to town in a horse-drawn grain wagon, given good weather. Of course, in more northerly and other thinly settled areas, the module was often stretched to as much as 20 miles between elevator towns along lines of railway, and up to 15 miles from farm to elevator town (12). But on the whole, the dense network of railway lines gave grain farmers a very generalized access to the transport system, and it is probably not exaggerating to state that this came to be thought of as a right of access.

Since then, new developments have operated to alter vastly both transport and the general style of rural life on the prairies. The motor vehicle, travelling along all-weather roads, has been the greatest single force for change. It now carries most of the passengers, mail and express, and much of the general freight, that used to move by rail. It has facilitated urbanization, and the organization of larger school, municipal and hospital districts. It has made it possible for rural residents to travel much further in search of the wider range of goods and services offered by cities and large towns. In this way, and in conjunction with rural depopulation and the shift to larger, fewer and more mechanized farms, it has changed the retailing role of many small towns from general-purpose shopping marts to convenience centres.(13)

What has changed least from the original geographical design of prairie life and transport has been the grain transport module. This is not to say that it has not changed at all: as we shall see in the next subsection, changes in elevator economics have brought some substantial shifts. But the alterations have been far less revolutionary here than elsewhere, with the result that many rail branch lines continue to operate on a "grain-dependent" basis. That is, whereas passengers, mail, express and general freight have deserted them in favour of road transport, they still continue to carry grain.

There are, at this point, no total figures of the cost of moving grain over all branch lines of this type. But careful research into particular lines is suggestive. The A.C.S.E. Working Group of the Efficiency Measures Subcommittee of the Senior Grain Transportation Committee released in September 1985 for discussion only, a High Cost Branch Line Study.(14)

In its initial research, the Group selected for investigation a branch line which it did not publicly identify. This line had a traffic density in 1983/84 of 1,180 tonnes per mile, putting it near the top of the lowest quartile of western branch lines in terms of traffic density. Among the options for the line that were examined were "Retain As Is" and "Complete Abandonment" (with substitution of truck haul). "Retain As Is" produced an estimated annual handling cost per tonne of \$44.11. For "Complete Abandonment", the estimate was \$30.46. Still another option, involving rehabilitation of the line to carry fully loaded grain hopper cars, produced an estimated annual cost per tonne of \$78.07.(15)

The Group was later asked to analyze a much higher volume line, with traffic density putting it into the top quarter of all western lines. In this case, "Retain As Is" gave an estimated annual cost figure of \$41.73, compared with \$34.89 for "Complete Abandonment". (15)

While such figures cannot by their nature be precise, and while, too, the truck-haul costs involved in "Complete Abandonment" would inevitably rise somewhat if other rail lines in the general vicinity were also being abandoned, the results do strongly suggest a major scope for economies by way of substitution of truck transport (to main line or heavy-duty branch line points) for much present day branch-line rail operation.

The Group's summing up is expressed in unusually vigorous language:

"The major finding from the analysis is that retention of a high cost branch line results in farmers in general and the federal government incurring costs in the millions to save local farmers and municipalities on the line, costs in the hundreds of thousands." (italics original) (17).

As does this present document, the Group's Report goes on to suggest modes of compensation for the local farmers and municipalities referred to, in the event of abandonment.

(3) Elevator Consolidation

So rapid has been the rate of primary elevator consolidation in western Canada, particularly since the mid-1970's, that to list it as a major area for the capture of further economies may almost seem to be leaning too hard on an already opening door. As Table 2 shows, from a peak of 5,757 in 1933, the number of primary elevators had dropped to 2,800 in 1983. The number of delivery points had also been about halved. Average capacity per elevator, by contrast, rose by nearly 3 1/2 times. Today's elevators (on average) not only hold more; they also have more trackage on which to spot long of grain cars, and they are more efficient in a variety of ways, with the computer playing an increasing role in their operation.

Table 2
Primary Elevator Consolidation in
Western Canada

(selected dates)

	<u>No. of elevators</u>	<u>No. of delivery points</u>	<u>Storage Capacity (million bushels)</u>	<u>Average Capacity (thousand bushels)</u>
1933	5,757	n.g.	192.8	33.5
1950	5,309	2,139	283.0	53.3
1960	5,299	2,068	361.8	68.3
1970	4,971	1,907	398.8	80.2
1975	4,165	1,556	398.2	95.6
1983	2,800	1,181	321.4	114.8

Source : Waithe (1984)

A few further points are worth noting. Much elevator consolidation to date has consisted of companies concentrating their operations at fewer points along particular lines of railway. If large-scale branch-line

abandonments are in prospect, the elevator companies must have adequate foreknowledge of what is to occur in this respect.

Also, great as has been the increase in average size and throughput of primary elevators, greater use of unit trains would seem to point to still further increases in these respects. In a world where, as we saw earlier, a railway like the Burlington Northern finds it worthwhile to offer substantial, cost-based rate discounts on grain car lots of 52 or more, it seems reasonable to suppose that we should in due course be seeing on the Canadian prairies much more than the present sprinkling of elevators in the half-million to million bushel capacity range, able -- with the aid of good trucking networks -- to load upwards of 30 grain hopper cars in a 24-hour period. And able also to clean the grain they ship, thus avoiding the absurdity of sending "dockage" or screenings, useful for livestock feed on the prairies, on a one-way or return trip to Thunder Bay or the Pacific coast.

It is impossible not to be impressed by the degree to which, up to now, the response of the elevator companies to changes in their own internal economics, particularly on the cost side, has been a driving force -- probably the predominant driving force -- for modernization of the gathering portion of the western grain transport system. The increasingly unacceptable high costs of small, low-throughput elevator units, plus, to a much smaller extent, actual abandonment of rail branch lines with elevators on them, has impelled a major, cost-saving consolidation of primary elevators. This, in turn, has made rail shipping costs less than they would otherwise be: the amount would be all but impossible to estimate, but there can be no doubt

that the setting out and picking up of larger average numbers of grain cars at fewer delivery points has had an appreciable downward influence on rail operating costs. Furthermore, by its very nature, elevator consolidation has already brought about some of the displacement of high-cost branch-line movement by lower-cost truck haul that dispassionate observers of the system believe must occur on a larger scale in the future.

The pressures of elevator economics alone may be expected to drive the system further in the same general direction. But for fuller capture of available system economies, a larger percentage of the drive must now originate directly in the rail and trucking components of the system. This in turn will present the elevator sector with certain difficulties and uncertainties, but also new challenges and opportunities.

(4) Improvements in the Trucking Network

Much of the discussion to date of the role of trucks in future grain transport has concentrated on the substitution of truck haulage for rail branch-line movement. Far less attention has been given to possible efficiency improvements within grain trucking itself. Yet there may well be major opportunities here. One knowledgeable interviewee for this study (speaking as a steady succession of trucks of various sizes and types pulled up to discharge grain at a large, nearby elevator) gave it as his impression that the fleet of trucks which moves grain in the central plains area of the United States is significantly more modern and efficient than the corresponding Canadian fleet, and is put to use more fully and effectively.

Unfortunately, data have not yet been found that would solidly confirm this impression. Yet it seems at least a plausible hypothesis. Trucks are characterized by significantly increasing net returns to scale, in terms both of tonne/kilometers produced per trip, and of rates of year-round capacity utilization. The deregulated grain-transport environment in the United States would be likely to give ample and indeed growing scope for capture of these advantages.

Three major types of grain-truck operator are customarily distinguished. First there is the farmer driving his own grain to an elevator in his own truck. Then there is the "custom" haulier, specialized in grain movement, and hauling several farmers' grain -- including, very often, his own. Finally, there is the "commercial" operator, hauling grain and other commodities, and sometimes able, on a return trip, to match a haul of grain one way with a forehaul or backhaul of something else in the other direction. When this happens, it of course improves the economics of the total journey, sometimes dramatically.

Like the custom haulier, the commercial operator must bid for grain business, on the basis of price, to farmers of whom the vast majority have always the reservation option of hauling their own grain in their own equipment. For the price to be "right", custom and commercial operators must arrange their affairs to have substantial cost advantages vis-a-vis the self-hauling farmer. If, through "dial-a-truck" communications networks, operators can respond promptly and reliably to farmer requests for grain haulage, this too tends to increase their share of the business. A certain seasonal variability must be accepted, inasmuch as the farmer's opportunity

cost of hauling his own grain varies with how seasonally busy he is with other things.

There can be interesting intermediate categories or sub-categories of haul-for-cash operator. For example, in the central United States may be found custom hauliers of a wider range of agricultural products than simply grain. Some of their rigs have removable plastic liners that permit them to carry, alternately, wet or oily, and dry cargoes. This permits them to seek a wider variety of cargoes, and so also to range north and south, from the Canadian border to the Gulf of Mexico, according to season. And this in turn permits them to achieve higher annual rates of capacity utilization.

It is also useful to categorize physical equipment. For our purposes here, it is sufficient to distinguish three major types of truck. First, there is the two-axle, or tandem three-axle, rigid bodied "straight truck". Second, there is the familiar tractor/semi-trailer rig, with only one trailing box. Finally, there are the complex "semis" with double boxes behind the tractor unit. In the "B-train" type, one semi-trailer draws another of its own kind behind it. In the "A-train" type, one semi-trailer draws a free-standing true trailer behind it.

Again for our purposes here, some broad generalizations may be permitted. One is that as distance of haul increases, and providing of course that there is enough grain to fill the box or boxes, it becomes more and more economical to use a larger truck. Up to 40 kilometers or so, the differences are insignificant. But from there on up to 250 kilometers and

beyond, the cost-advantages per tonne of grain shipped become much more interesting (18). Some of this may be perceived in Diagram 1.

Another permissible generalization is that, again beyond 40 kilometers or so, the lowest cost per tonne/kilometer is likely to be achieved by a commercial operator, the second-lowest by a custom operator, and the highest by a farmer hauling his own grain. For this ordering, there are two basic reasons. One is that the commercial operator, and to a lesser extent the custom operator, are likely to be using larger trucks. The other is that the commercial and custom operators are likely to be achieving better year-round rates of capacity utilization. And if the commercial operator is rounding up some forehauls and backhauls, he will do better still on this score.

These are, to repeat, extremely rough generalizations, and readers questioning them and/or seeking further figures and other data are urged to go back to the source documents cited (19). One thing that must not be concluded is that significant further increases in average distances of grain trucking on the prairies would soon force most producers and custom operators now using straight trucks to invest in larger units. Account must be taken of the present low average rates of utilization of straight trucks, and of the consequent scope for reducing unit costs even without purchase of bigger equipment. As a University of Manitoba study puts it:

"... the present low level of utilization of farm trucks, as indicated by annual truck mileage, would not be a

constraint to increasing the distance for hauling grain to the elevator. In fact, a greater utilization of farm trucks would result in lower unit costs for transporting grain. In light of these facts, it does not follow that increased hauling distances to the elevator will force many farmers to invest in new and larger trucks, as has been suggested by some opponents of rationalization of the grain transportation and handling system." (20)

What seems likelier than any sudden changeover as trucking distances lengthen is a more gradualistic scenario. As distances lengthen, lower costs per tonne/kilometer will be achieved with existing equipment. At the same time, however, the incentives for custom and commercial operators, in particular, to invest in bigger equipment will increase, as will, quite naturally, their proportionate role in the total grain-trucking picture.

Putting matters another way, there is a range of increasing distance over which it often makes sense for self-hauling farmers to capture lower unit costs with existing equipment. What rarely, if ever, makes sense, is for a farmer to invest in complex, high-capacity equipment to haul only his own grain. It takes a custom or commercial operator to get the best out of that kind of truck. Given increasing distance, and thus widening cost advantages for complex trucks, it may be expected that more and more custom (including farmer/custom) and commercial operators will enter the business and offer increasingly attractive competitive prices to farmers. In this fashion, we may expect to see emerge, on average, a more efficient, and a more efficiently utilized, total grain-trucking fleet.

It is not to be expected that this fleet will be such that it can ultimately aspire, except perhaps in some extreme eastern and western parts of the prairies, to challenging the railways for the full hauls to Thunder Bay and the Pacific Coast. Over distances of 250 kilometers or more, high-volume rail haul will still have too much of a cost advantage over trucks. Nevertheless, as experience in the United States indicates, a larger, more modern Canadian truck fleet will tend to operate, if perhaps to a lesser degree than south of the border, as an important natural (as opposed to regulatory) check on rail rates. If the latter, presumably still distance-related to an important degree, are tending to go "too high", the larger truck units in the modernized fleet will tend to reach out, in terms of distance, for a larger share of the total haul to export gateways. If we care to think beyond the Phase II transport improvements that are the subject of this paper, to a Phase III in which western producers are ready to put more confidence in natural competitive forces as the surest means of minimizing their transport costs, this is an aspect worth attention.

But, in the immortal words of Paul Hiebert, "What about the roads?" (21) Do not larger, more complex trucks impose more punishment on the roads? The answer is yes and no. Substantially more tonne/kilometers of grain moved over prairie roads unambiguously does punish them more, and the means by which provincial and municipal governments may recover the cost of dealing with this is a subject to be taken up later in this paper. But another noteworthy fact, emerging in table 3 below, is that semi-trailer rigs and other more complex trucks, because they spread their loads over so many axles, punish the roads markedly less per tonne carried than do straight trucks.

Table 3

(Note: "ESAL" stands for "Equivalent Single Axle Loading"
for a fully loaded truck)

	Normalized Road Damage: ESAL-passes per 100 tonnes of grain moved
Straight Truck, 2-axle	25.7
Tractor/Semi-Trailer, 5 axles	10.7
A-Train Rig, 7 axles	15.7

Source : IBI. (1985) p. 57.

Transport Efficiency Capture -- The Deregulated U.S. Model

We must now move from "What" to "How" -- from specification of the four chief forms of further cost-saving potentially available in the Canadian grain transport system, to a consideration of how best these economies can be captured. As a first step, let us look briefly at how some of them have been captured in the more deregulated transport environment of the United States.

Two important qualifications should be entered at the outset of our examination. The first is a warning against the casual assumption sometimes made by Canadians that, particularly in the 1980's, government regulation and other intervention in all sectors of the American economy is very much less than in Canada. This is certainly not true of the "military-industrial complex." And if we look at the entire grains and oilseeds sectors of agriculture, plus their transport and other forward linkages, it is not true there either:

"Studies by Glenn, Carter and Tangri estimated that total subsidies for wheat in the United States, expressed as a

percentage of the total value of wheat production, averaged 18.5 percent over the 15-year period from 1965 to 1979. They estimated the Canadian average subsidy for wheat over that period as 11.6 percent. From 1970-71 to 1980-81 the U.S. subsidy averaged 12.5 percent and was considerably more variable than the Canadian average subsidy of 14.5 percent." (22)

Against a background of weak world wheat markets in the 1980's, according to a Canadian Wheat Board estimate, the subsidy transfer per bushel of wheat in the United States shot up in 1982/83 to three times the corresponding transfer in Western Canada.(23) This, of course, was before the devastating outbreak in 1986 of subsidy warfare between the United States and the European Economic Community.

Taking one year with another, the biggest difference between government support of the grains sector in the two countries lies not in the overall percentages, but in the form of support granted. The United States has emphasized price and income supports to producers; Canada, by contrast, has concentrated on subsidizing producers' transport -- perhaps an understandable tendency where distances are greater and settlement sparser. That fact understood, we may indeed proceed to a statement that the transport of grain in the United States is far less subsidized (24) and regulated than in Canada, and that this has led to highly interesting differences in the evolution of grain transport in the two countries, especially since 1980.

A second preliminary observation amounts to no more than an overt recognition that the overall situation of the grains sector in the United States in recent years has been very far from a happy one. Such factors as weak export markets, heavy farm debt burdens and rising bankruptcies have made these years ones that many grain and oilseed producers would dearly like to forget, if they could.

But that is in no way inconsistent with some positive developments in grain transport. Especially since the two major deregulatory statutes of 1980 -- the Staggers Act (rail), and the Motor Carrier Act -- the combination of rail, water (including both the Great Lakes and Mississippi waterways) and truck modes serving agricultural producers in the central plains area have adjusted in quite striking fashion.

Railways in the area are both freer to abandon unprofitable branches and to offer "variable rates" (volume discounts in the form of multicar rates). Elevator companies have tended to consolidate their physical capital and operations at fewer locations to benefit from the discounts. In order to fill larger numbers of cars at those locations, they there offer higher grain prices to farmers. The latter respond by accepting the cost of longer truck-hauls to these locations because of the higher rewards at the end of the hauls. That is how they get their share of the flowback of real resource savings from more efficient transport of their products.

A recent staff paper from the Upper Great Plains Transportation Institute describes the situation in North Dakota thus:

"A significant change in concentration has occurred in the North Dakota country elevator industry since the introduction of multi-car rates. It is evident that it has increased at an increasing rate since 1980 with the advent of multi-car rates and subterminal grain elevators. In the country elevator industry, however, increasing concentration is not an indication of monopoly power. Instead it appears that fewer elevators, each with more capacity and larger market shares, and the stability of the largest firms, contribute to increased competitiveness in the grain handling system. The fact that most elevators are cooperatives and that elevator markets are contestable will prevent market dominance from occurring.

"This change may mean greater efficiencies for the rail system as well. Hauls will be longer, more direct and in larger volumes. Railroads are also taking advantage of economies of size in handling multi-car shipments. Between increasing volume and decreasing costs, railroads should continue, even promote, multi-car shipments. Multi-car shipments offer efficiencies for both the elevator and rail systems in the state. These shipments will likely grow to be the dominant method of moving grain in the future." (25)

The multicar rates have encouraged a tendency towards more unit-train operation that was already evident before 1980. With unit trains, the railways have been able to do such things as challenge Mississippi barges periodically for the full haul to the Gulf of Mexico, and to establish rail haul to the Pacific coast, from as far east as Minnesota, as an export channel competitive with the Mississippi/Gulf and St. Lawrence Seaway routes.

Some branch lines abandoned by the major railways have been reactivated, in whole or in part, as low-labour-cost short lines. Also, some smaller country elevators, no longer served, or served often, by rail, have continued to perform a function as intermediate and supplementary off-rail storage capacity for grain backed up in the system. Many observers expect, however, that as grain starts to move more freely in the system again, this function will wither. And prognostications for grain-dependent short lines tend to be less favourable than they are for some non-grain short lines elsewhere, with the latter enjoying the advantage of access to on-line industries capable of generating larger numbers of carload shipments per year, often on a year-round basis, than a typical grain branch.

One of the more significant problem areas in the developing U.S. scenario has proved to be roads. A special reason for this is that much of the strain of additional grain trucking has fallen on local roads (26), and that mechanisms whereby state governments might help municipalities out in this matter, by channelling more gasoline-tax and motor-vehicle license revenue their way, are relatively underdeveloped.

What are the lessons to be learned by Canada from this U.S. experience? The chief one is the general direction in which the system seems to be moving in search of real resource saving: towards longer truck-hauls, fewer but higher-throughput elevators, and more use of unit trains. The more market-oriented U.S. situation reveals fundamental forces for change which are bound to be felt in Canada too, even if in somewhat modified form.

May the U.S. experience persuade Canadians to opt for a more rapid move to general deregulation of grain transport? Close observers of the intense political and pressure-group activity from which emerged the final version of the WGTA(27), or of the submissions and presentations to the CTC's 1985 hearings in Saskatoon on the subject of variable rates (28), might, with much justification, dismiss the question as politically naive, certainly for the near-term.

To some extent also, the more "political" and regulated status of Canadian grain transport reflects some more underlying geographical and economic differences between the two countries. Generally, deregulation is apt to seem more attractive, and to achieve more positive results faster, in fairly dense, readily contestable markets, with much "poised competition" available.

These conditions were in 1980 (and of course remain) well satisfied in the central plains area of the United States. Compared with Canada, relevant factors include:

- (1) Denser population;

- (2) Presence in or near the principal growing areas of numerous, large processing and consuming metropoli such as Dallas/Fort Worth, Oklahoma City, Denver, Kansas City, St. Louis, Chicago, Milwaukee and Minneapolis/St. Paul;
- (3) Higher proportion of domestic disappearance of grain and lower proportion of exports;
- (4) More competing railways, even after recent mergers and abandonments;
- (5) A denser network of custom agricultural and general commercial trucking;
- (6) The huge Mississippi barge system.

What all this adds up to is far more transportation options for the average U.S. grain producer. With a shorter average haul to waterway or domestic processor, and with larger-scale and more sophisticated trucking service "on call", trucks are for him a much more frequent practicable alternative to rail for the entire overland haul.

It is fascinating to witness how quickly the system adjusts to changes in relative freight rates and other factors. In the case of southwestern Minnesota corn, between the short-crop year 1977 and the better year of 1979, rail all but eliminated truck for the haul to Duluth/Superior.

At the same time, however, truck largely displaced rail for the shorter haul to processors and barge terminals in and near Minneapolis/St. Paul. Yet again, comparing 1979 with 1977, the railways moved far larger volumes of corn direct to the Gulf of Mexico in competition with barges, and also began hauling significant quantities to the Pacific coast. To a Canadian, the richness of both modal and routing alternatives for producers in this area, and the fierceness of competition for their business, is impressive. (29) And this was before the 1980 deregulation!

The United States can more readily cast the transport of its grain upon the ocean of the free market because there is so much varied transportation competition, ready to move in whenever the price signals are right.

Shift up into south-central Saskatchewan, however, and a significantly "leaner" transport situation may be seen to prevail. For the greater part of the much longer average haul to market, there really is no alternative to rail, and there are only two railway companies. Also, trucking is less developed, and for climatic reasons alone the Hudson Bay route cannot begin to compare with the Mississippi as a third waterway alternative. The reluctance of Western Canadian producers to abandon rail freight-rate and other regulatory protections rests in part at least upon some real differences between their situation and that of their U.S. counterparts.

But that is no excuse for failing to do everything possible to bring about the lowest possible real cost of moving Canadian grain from where

it is grown to where it is delivered. The longer average haul -- the higher percentage of overland transport cost to be deducted from the world price -- makes this, indeed, a more critical issue for Canada than for the United States. A blow to complacency on this score, and an indication of how much less than state-of-the-art is our present east/west grain transport system, is provided by the following finding of two U.S. researchers:

"... our previous research indicated that as transport costs increase as a result of Crow Rate rationalization, the total logistics costs for some of Canada's export grain shipments could be reduced by utilizing barge transportation on the Mississippi River system or unit trains to deep-water ports on the U.S. Gulf." (30)

It would be inexcusable, above all from the standpoint of the interests of prairie grain producers, not to learn all that may usefully be learned from recent American experience, and to incorporate it, with appropriate modifications, into a Phase II improvement of our more regulated system.

Public Choice Theory

Our discussion from this point on will be aided by the employment of a very simple version of the public choice theory that has played a growing role in the recent literature of economics and political economy (31). That role has not gone uncriticized, and we do not wish (nor is it necessary for our argument here) to present public choice theory as a

complete theory of politics and governmental decision-making. But it does seem to apply peculiarly well to one of the central conundra of how to achieve Phase II improvements in the Canadian grain transport system.

Let us start with an example from another area: that of overt and de facto restrictions on the import into Canada of such commodities as shoes, textiles and Japanese automobiles. How is it, in a democratic country, that these restrictions can be so long-lasting? The number of Canadians who gain from them -- essentially, Canadians employed and otherwise deeply involved in the domestic production and sale of these commodities -- runs only into the hundreds of thousands. The number of Canadians who lose by the restrictions -- essentially, consumers of these widely purchased products -- runs into several millions.

Roughly and briefly, the explanation of this type of situation offered by public choice theory centres on the fact that whereas each of the millions of consumers has at stake in the matter at most a few dollars only, the average per-capita stake of the producer interests on the other side is many times this amount. For this and other reasons, including the propensity of most of the millions of consumers to catch a free ride on the anti-restriction representations of bodies like the Consumers' Association of Canada (enjoying the benefits of these representations to the degree that they are occasionally successful, but not contributing to the C.A.C.'s legal and other representational costs), the producer interest message is likely to reach government much more forcefully and repeatedly. The fact that the producers are much fewer in number, and perhaps also concentrated in a

limited number of ridings where the textile (say) industry is a major employer, is for them an important organizational advantage.

It will be seen that public choice theory rejects naive views of government as defender of some sort of monolithic essence entitled "the public interest", or as a semi-mechanical, issue-by-issue poll-taker and electoral vote-maximizer. On the other hand, it does not substitute for these naivetes another to the effect that, "the lobbies always win".

What the theory does try to do is to recognize the complexity of modern government, the fact that it goes to the people at election time with multiple packages of promises and programs, that much of its on-going activity consists of difficult conflict-resolutions through rule-making and other techniques, and that both government and those who wish to influence government action must confront (with varying degrees of success) problems of informational, organizational and "political transacting" costs. Outcomes are seen to depend critically on how much groups have at stake (as in the simple, import-restriction example above), on how clearly they perceive those interests, and on how readily they can get together to do something about them.

Once again, it has to be emphasized that this is much more than a simple theory of lobbying. For a full-blown public choice analysis of an issue, it is necessary to identify all of the relevant actors, including not least bureaucrats, politicians and media, and to try to discern the nature and intensity of the interest that each has in bringing about particular outcomes. The processes by which the original Crow Rate revision proposals

of the Gilson Report became transformed into the final version of the WCTA would, one would think, offer something of a gold mine to a really dedicated adherent of public choice theory (32).

We have here neither the space, nor, probably, the need, to engage in a full-blown public choice analysis of what now is to happen in respect of western grain transport. The A.C.S.E. Working Group report (33) employs to very good effect a pared-down segment of public choice theory, and we shall follow its example in some respects quite closely.

The group's conclusion may be recalled that retention of a high-cost branch line imposes costs in the millions on western farmers in general and the federal government, while saving local farmers and on-line municipalities amounts in the hundreds of thousands only. How, in a democracy, does such a situation manage to persist?

The group's answer is as follows:

"However, over against the savings which accrue to grain producers generally, are the costs which are incurred by local producers and municipalities whose rail line and elevators would disappear and whose road maintenance and upgrading costs would increase. As the case study demonstrates, these costs in aggregate can be far less than the total savings, but are borne by a much smaller segment of the farm community. Thus for local producers, the costs of abandonment exceed the benefits. This fact

creates both a political and an economic problem. There is at present no way that the costs borne by the local groups can be offset by a transfer of some part of the total savings achievable by abandonment." (34)

Essentially, there is a problem both of the diffusion of cost information, and of cost compensation. In principle, the winners by abandonment could compensate the losers, and everybody still be large net winners. In practice, this is neither clearly evident to all of the actors, nor possible to achieve under present rules. Consent must somehow be obtained from enough of the actors to change the rules appropriately.

The group's analysis can be well enough expanded from branch-line abandonment only to the broader, four-item context of potential system economies under discussion here. Let us proceed, therefore, to identify the principal actors and their perceived interests as the system and its rules now stand.

The Principal Actors and Their Interests

The actors to be examined here are the following:

- (1) Grain producers;
- (2) Railway companies;
- (3) Elevator companies;
- (4) Federal government;
- (5) Provincial governments;

- (6) Municipal governments;
- (7) Local communities;
- (8) Custom and commercial truckers;
- (9) Railway employees;
- (10) Elevator employees.

As will be seen, under present conditions, the only clear potential winners from full, four-source, system efficiency improvements in Phase II are grain producers generally, the federal government, and custom and commercial truckers. All others are either clear losers or ambiguously mixed loser/winners.

Under the WGTA, with its escalating schedule of producer participation in rises in rail transport costs for grain, grain producers collectively have a strong interest in capturing efficiencies and so keeping down costs. But as already indicated above, in any given local area, such developments as branch-line abandonment, or accelerated elevator consolidation brought about by railway offers of multicar rate discounts designed to capture more railway efficiencies, present the producer with a prospect of immediate cost increases for, e.g., extended truck-haul. Against these, he perceives only the most vague and uncertain prospect of later participation in system-wide cost savings. As Dr Murray Cormack of Manitoba Pool Elevators put it, in remarks to the 1982 annual meeting of the Canada Grains Council:

"Now the one further point that I want to make is that if we're talking about change to this country system or any

other system for that matter, and there are net benefits -- in other words if the increase in benefits outweighs the increase in costs, then each of the participants in that system is going to have to share in those net benefits in some fashion or else there is not the incentive to make the necessary changes and you're going to see resistance to those changes. Now I want to relate this to the observation that a very large majority of the producers in Western Canada are not enthusiastic about a major consolidation of the country elevator system because in that change they perceive their costs to rise considerably, that is the costs of getting the grain to those points of shipment. I don't think they're convinced that if there are lower costs to be achieved in some other part of the system that they're going to get passed on back to the producer and therefore they are concerned about the kind of a change that might take place." (35)

In brief, producer sharing in the benefits of system modernization must be spelled out in a much more concrete, area-specific and guaranteed form than it has been to date. Vague, governmental promises, or invocations to the Market to work its legendary magic over some unspecified "longer run", will not be sufficiently persuasive in a region where grain, transport, politics and long-established traditions of pooling and sharing have so long been associated in a variety of significant ways.

Turning to the railway companies, while the WGTA has most usefully restored their general incentive to seek out grain to move, and then to move it, the general regulatory scheme of the Act, whereby the railways are assured of enough revenue to cover the specified costs, weakens what would otherwise be their incentives to seek cost reductions. Thus, while some branch lines are very costly to operate, the costs get covered, abandonment inevitably entails negative publicity and possible labour trouble, and in competitive territory served by lines of both railways, the first railway to abandon may lose market share to the other.

The offer of multitar rates has attraction as a means of drawing market share away from the competing railway, but the cost savings from the consequently greater proportionate use of unit trains are in principle experienced over a maximum period of four years only, at the end of which, under the WGTA, revenue is readjusted to cost. It should be noted also that substantial parts of the prairies, such as southwestern Saskatchewan, southern Alberta and much of northern Alberta, are not competitive territory as between railways -- i.e., they are dominated by one carrier or the other.

The principle that system participants who contribute to improved system efficiency should be appropriately rewarded is enunciated in both the Gilson Report and the WGTA. (36) In the fine print of the WGTA, however, whereas both "awards" and "sanctions" are provided to system participants according as they respectively add to or detract from system efficiency, in the case of the railways, no awards are stipulated -- only sanctions and cost coverage. This seems neither equitable nor efficient.

As noted previously, elevator companies have already been substantial contributors, through consolidation and modernization, to gains in system efficiency. As, however, their consolidations become proportionately less planned by themselves, and proportionately more driven by external factors such as line abandonments and offers of multicar rates, their incentives become more mixed:

"On the one hand, they are consolidating their elevator system, and accordingly, would in some cases like to see lines abandoned. Moreover, there is an increasing tendency to look at elevator rationalization, by area, taking the branch line situation into account. However, despite this trend, for some companies, rationalization is as much or more conveniently conducted along rail lines rather than between them. Furthermore, market share considerations sometimes enter in. Consolidating three single company points along one rail line may be more attractive than having that grain go to competitive points on an adjacent line. The companies (four of the biggest of which are producer co-operatives) must also be sensitive to the needs and desires of their members to retain rail service." (parenthetical phrase added) (37)

The federal government shares with producers generally an interest in cost reduction, but must also be responsive to the concerns of local

producers, municipal taxpayers, etc. It has at present no efficient policy means by which to reconcile efficiently these conflicting pressures.

Provincial governments have strong concerns about increased road costs resulting from grain system modernization, the more so since their current structures of motor-vehicle license fees and fuel taxes would not come near generating automatic cost-recovery here. Indeed, two of the prairie provinces have no road-user fuel taxes, and one of these pays a fuel rebate in respect of farm-registered vehicles.(38) Again we observe the tendency of Canadian governments to help the western farmer by helping him with his transport, and again the peculiarly Canadian dilemma this gets us into when, in the interests of the farmer himself, we want to restructure the transport system to accommodate cost-lowering technological change.

Municipal governments have common concerns with provincial governments about road costs, and many also fear loss of tax assessment through branch line abandonment and elevator closures. On the other hand, a smaller number of municipalities would gain tax assessment through the construction of larger, consolidated elevators within their boundaries.

Local communities may here be distinguished as separate actors from municipalities, inasmuch as they may have concerns over and above reduced tax assessment about general loss of population and socio-economic vitality.

Custom and commercial truckers would be unambiguous winners from system modernization; their total volume of business could only increase.

Fewer branch-line trains would mean fewer railway employees, and fewer, larger and more automated elevators would mean fewer elevator employees. It would be important in both these cases to consider likely numbers, phase-out schedules and age profiles, in order to determine how much of the loss might be absorbed by natural attrition.

New Rules: A Tentative Scheme

What now follows comes in two parts: a set of initial, guiding principles, and a set of proposed operational rules. In some respects, the scheme resembles that for branch-line abandonment put forward in the A.C.S.E. Discussion Paper. (39) The resemblance is attributable partly to prior conclusions independently arrived at (e.g., the desirability of proceeding on a district-by-district, rather than a prairie-wide basis), and partly to later appreciation here of the good sense of many of the A.C.S.E.'s ideas.

In other respects, however, there are differences from the A.C.S.E. paper. For one thing, there is a difference of scope: multicar rail rates to promote the use of unit trains, and other dimensions of system efficiency-capture besides the abandonment of high-cost branch lines, are brought into the picture here. Another notable difference concerns the method of compensating for additional trucking and road costs (although both documents are agreed that such costs should be compensated.).

These differences will be referred to again later in a general summing up. Many readers may nevertheless find it helpful to have the A.C.S.E. document ready to hand while perusing what follows.

Initial Principles

(1) Major system modernization could in principle be achieved by a general deregulation of rail freight rates, branch-line abandonments, and prices paid for grain at country elevators, as in the United States. But as

the Canadian political climate stands, such a drastic, one-stroke solution seems quite out of the question now, or in the immediate future. Yet delaying a solution would be very costly. Therefore, seeking an alternate solution (what a die-hard neo-classical economist might term a "second-best" solution) seems a worthwhile exercise.

(2) The general object of the exercise should be to achieve maximum Phase II improvements in the western grain transportation system. These improvements should be sought on all four interrelated counts of more operation of cost-effective unit trains, abandonment of rail branch-line operations that are excessively high-cost in relation to available alternatives, greater elevator efficiency and greater trucking efficiency.

(3) The principal ultimate beneficiaries of the exercise should be western grain producers in particular, and the western and Canadian economies generally. No producer should lose by change, and all should be ultimate gainers.

(4) The well-tested psychological hypothesis of "cognitive dissonance" should be kept firmly in mind throughout, whereby, other things equal, people tend to value something they already have (e.g., rail branch line service) more highly than something they might have (e.g., a share in efficiency gains from a change to truck haulage). This implies that to command acceptance, the "might have" must be spelled out in advance with some clarity and at least rough, numerical specificity. It should also be guaranteed for some time into the future.

(5) No new federal government funding is needed nor should be provided. The scheme involves the capture of cost savings and their channelling to producers and others in a somewhat different manner from what would occur under present legislation and rules. In some years federal taxpayers would be gainers, notably in those inflationary years in which, without the efficiency gains here envisaged, the total cost of rail movement of western grain would increase by more than the maximum six per cent producer-share stipulated in the WGTA.

(6) In accordance with doctrine enunciated in the Gilson Report (40), all participants who contribute significantly to the capture of system efficiencies should receive some reward, such as reasonable rates of return on contributions in the form of new capital investment.

(7) It is assumed that throughout Phase II, railway freight rates on grain will continue to be regulated by some appropriate authority.

(8) It is assumed also that the basic operations of the Canadian Wheat Board, such as the system of initial payments and pooled crop-year payments for "Board grains" will be continued. Some more detailed changes, as in the present system of quota allocations, would be necessary.

(9) The familiar and long-accepted concept of distance-related, single-car rail freight rates should be retained and used as the invariable base against which percentage multicar discounts from all delivery points are calculated. (This should not be read as ruling out marginal adjustments in

the distance-related rate structure that may be judged appropriate for other reasons, such as correction of anomalies, inequities, etc.)

(10) The concept of reasonable equality of producer access to the grain transport system across the main growing area should be retained, but reinterpreted in terms of modern technology, travel times and travel costs.

(11) In territory where grain producers now have an effective choice between two rail carriers, that choice should, if at all possible, be retained --though, once again, in terms of modern technology and road travel times.

(12) The self-haul, custom and commercial grain trucking industry should be accorded more status, attention and analysis as an increasingly important component of the total grain transport system.

(13) Other things equal, the new system, and the pattern of compensation payments included in it, should be kept as simple and understandable as possible.

(14) Other things equal, the new system should lend itself readily to a future transition from "Phase II" to "Phase III". That is, as and when Phase II system improvements become sufficiently generalized, and sufficiently reinforcing to the confidence of grain producers, prairie-wide, in the power of natural competitive forces to minimize their transport costs, a shift to a less regulated, Phase III system should not be unduly complicated.

Operational Rules

(1) Although this is not spelled out in detail, these new rules will require certain legislative changes.

(2) At an early date, the federal government should confirm what many already know to be the case, viz., that bodies created under federal statutes are actively examining possibilities of further efficiency-promoting changes in the western grain transportation system likely to be of benefit to producers. In making this announcement, the government should go on to state that it is seeking changes whereby no individual producer would be disadvantaged, but where, rather, all producers would be gainers. More specifically, it would be indicated that no branch line presently guaranteed to the year 2000 would be "unfrozen" without an offer to affected producers of economically attractive transportation alternatives, and a careful ascertaining of their views thereon. (The purpose of this announcement would be to allay unwarranted fears, and to elicit highly necessary co-operation in the collection of data and other preliminary steps.)

(3) The two chief regulatory authorities in what follows would be the "Rate Regulation Authority" (so called because of impending changes affecting the present Canadian Transport Commission), and the existing Senior Grain Transportation Committee. The role of the Rate Regulation Authority (R.R.A.) would be to provide what would be strictly necessary in the way of on-going surveillance and regulation of railway freight rates on grain, the system of trucking credits to be outlined below, and the management of the System Improvement Reserve. The role of the Senior Grain Transportation

Committee (S.G.T.C.) would be to operate as the active agent of change, to reach out into communities, to research and communicate relevant facts, to engage in community dialogue, and on the basis of all the foregoing to recommend to the R.R.A. changes in branch-line operations and related matters. Apart from examining any possible problems in system-wide rail operations, the R.R.A. would normally accept S.G.T.C. recommendations on matters within its sphere of responsibility and pass them through to the Minister of Transport for final consideration and approval, or other action.

(4) The System Improvement Reserve (S.I.R.) should henceforth be operated as a revolving fund, in accordance with recommendations by the S.G.T.C., and with on-going, day-to-day management by the R.R.A. Inpayments should consist of a share (of a size later to be determined) of actual efficiency gains realized through the abandonment of high-cost branch lines and the increased employment of unit trains. Outpayments should consist of two types of compensatory payments to be detailed below. These are trucking credits payable to producers to cover increased trucking and road costs brought about by the types of system modernization mentioned, and payment for "Community Redevelopment". The amount of \$50 million presently in the fund should serve as initial "pump-priming" -- i.e., as a means of making some early outpayments before there has been a full opportunity to collect the S.I.R. share of related efficiency gains.

(5) Reflecting variations in conditions across the Prairies and Peace River region, and also partly related variations in producer desires to give early consideration to significant changes in the grain transport system in their own particular areas, the region should be divided into "Grain

Transport Districts", along somewhat the lines developed by the Hall Commission (41). (It is to be expected that many grain producers will wish to see how, in actual practice, system changes work out in other districts before considering changes in their own districts.)

(6) The branch-line alternative costing research developed on a trial basis by the A.C.S.E. group should be extended to all prairie branch lines, including lines guaranteed to the year 2000, and lines presently scheduled for future rehabilitation and up-grading. There should also be a further development of costing scenarios for unit-train transport of prairie grain. Both estimated single-car and multicar costs in Canada, and actual costs and multicar rate discounts in the United States, should be included in the information package, with a view to giving the most realistic possible impression of the transportation economies available.

(7) Upon request from producers in any Grain Transport District, the S.G.T.C. should send a team into the District armed with the full information package, including information about transport costs over existing branch lines serving the District, about transport costs and rates in the District with alternative trucking service, about compensation available from the S.I.R. fund, and about further S.I.R. fund compensation available in the event that railways begin offering multicar rate discounts in the District.

(8) Dialogue should then be engaged by the team with District producers with a view to determining whether a majority of producers would

favour abandoning one or more branch lines serving the District, and having the District designated a Grain Transport Improvement District.

(9) Should the S.G.T.C. team determine that a majority of District producers are in favour of such action, it should so report to the S.G.T.C., which in turn should recommend to the R.R.A. that line abandonment and other appropriate action be taken, and the compensation package put in place.

(10) In respect of any Grain Transport Improvement District, any railway company should be able to apply to the R.R.A. for permission to offer percentage multitar rate discounts in that District, and this permission should normally be granted if the R.R.A. is satisfied that the following conditions obtain:

- (a) That the rate discounts will be available from any and all practicable shipping points in the District (thus offering to elevator companies maximum freedom of response to the discounts);
- (b) That they reflect real railway cost savings (at the railway's request, cost figures disclosed may be kept confidential between the railway and the R.R.A., for competitive reasons);
- (c) That the rate discounts be offered on a percentage basis for a minimum period of ten years, and thereafter be changed only with the permission of the R.R.A.;

(d) That the S.G.T.C. has been advised of the proposed discounts, and has informed the R.R.A. that it foresees no special problems in the District to justify delay or modification in the providing of the discounts.

(11) Any railway company may match multicar discounts offered in any Grain Transport Improvement District by any other railway company without having to make a fresh application to the R.R.A.

(12) Simultaneously with the permitted offering of multicar discounts in a District, the relevant compensation package should be put in place.

(13) The trucking credit portion of compensation packages should be determined in the following manner. On the basis of prairie-region-wide studies, a standard trucking-plus-road-cost per tonne-kilometer, over distances between, say, 10 and 80 kilometers, using existing equipment, should be calculated. In accordance with the equal-treatment principle, this rate should not be allowed to differ between Grain Transport Improvement Districts except where there is some clear, measurable and substantial reason (such as an above-average ratio of light vulnerable pavement on local roads) for it to do so. The rate should become the basis for the calculation of trucking credits in Grain Transport Improvement Districts, for grain transport over distances ranging from 10 kilometers up to some appropriate maximum for that District. The maximum should be set to compensate for longer truck hauls occasioned by system efficiency-capture, without encouraging significant, excessive cross-hauling.

(14) Trucking credits should be payable upon delivery of grain at elevators to self-hauling farmers compelled to haul grain further because of, e.g., branch-line abandonment. Appropriate catchment areas should be defined, and provenance of the grain should be confirmed by reference to the Wheat Board quota book. But trucking credits should also be conveniently transferable. Custom and commercial hauliers should be able to bid for a farmer's grain haulage and for his trucking credits, where applicable. It is important in the long-term interests of the system as a whole and of producers generally that custom and commercial haulage be encouraged to grow wherever it has significant inherent cost-advantages over self-haulage.

(15) Trucking credits should also be a distinguishable part of compensation payable at elevators for grain that has been truck-hauled over longer distances because of the offer by railways of multitar rate discounts. Here, the trucking credit would be more of a book-entry than in item 14 above (the producer having in effect received his trucking credit in the form of a higher price at the elevator for his grain, passed back to him by the elevator as a sharing in the rail discount), but the book-entry would be necessary for purposes of item 16 below.

(16) To recover additional road costs occasioned by longer-distance truck-hauling of grain, provincial governments should establish percentage levies on trucking credits, and (in general accordance with standard procedure in respect of provincial sales taxes) appoint elevator companies their agents to deduct these levies from the credits before they are paid out. Parts of these levies should be passed through from provinces to municipalities, where appropriate.

(17) Amounts and payment-conditions of trucking credits in any Grain Transport Improvement District should be determined in the first instance by the S.G.T.C.; then the credits should be administered and annually inflation-adjusted by the R.R.A.

(It should be interjected that this somewhat elaborate scheme of trucking credits seems vitally necessary to meet, clearly and simultaneously, two of the most vigorously repeated objections hitherto advanced against system efficiency capture through branch-line abandonment and the offer of multicar rates. These are objections by local producers to bearing the cost of longer, uncompensated truck-hauls, and objections by provincial and municipal governments to bearing, uncompensated, the road-cost portion of those longer hauls.)

(18) The second of the two parts of the compensation package in any Grain Transport Improvement District should consist of "Community Redevelopment" compensation paid to local communities in relation to the loss of grain-elevator business through branch-line abandonment and the offer of multicar rail rates. Here again, from appropriate cost-studies, a standard, prairie-wide rate of compensation per thousand tonnes of grain-handling per annum displaced should be calculated. Compensation in this case should take the form of a one-time-only, lump-sum payment to the affected municipality, which would be free to disburse the funds in whatever manner seemed likely to shore up most the community's socio-economic vitality and assessment base.

(19) In a case of branch-line abandonment, the general accounting procedure would be as follows. The cost-saving by abandonment would be

calculated and incorporated into gross reductions of railway rates payable by all prairie grain producers. But a charge would first be made against those reductions on behalf of the S.I.R. fund, to ensure adequate financing of the two elements of the District compensation package. That done, the remaining balance of the system-wide rate reduction would be shared in by the local producers.

(20) In a case of a multicar discount offer, the accounting would be essentially the same. S.I.R. financing for related compensation payments would be a first charge against the discount, where taken up. The remainder of the discount would be enjoyed by producers delivering grain to multicar points.

(21) While this is not here worked out systematically and in detail, it will be evident that where full and appropriate response to branch-line abandonment and multicar discounts requires substantial new investment by elevator companies, the regulatory way must be clear for elevator companies to earn a reasonable rate of return on those investments.

(22) Also not worked out here, but well set forth in the A.C.S.E. discussion paper (42), are provisions whereby railways might continue, for non-grain or other operational reasons, to operate branch lines otherwise scheduled for abandonment, and whereby parties wishing to attempt operation of independent rail "short lines" or off-line elevators might be given the opportunity to do so.

(23) Consideration should also be given to allowing railway companies to retain for themselves, over longer than the maximum four-year period now permitted in the WGTA, some portion of the cost savings occasioned by greater use of unit trains. This would make for more consistent rewarding of different participants' contributions to system efficiency gains, and would also tend to encourage earlier introduction of unit trains and multicar rates in one-carrier-dominant territory, where there was not the same market-share incentive as elsewhere to innovate in this way.

Some Further Notes on the Compensation Package

In the compensation package here, additional trucking costs are compensated on an annual, on-going basis. In the A.C.S.E. paper, it is proposed that they be estimated for some years ahead, then capitalized to net present value and compensated by way of a one-time-only, lump-sum payment to producers, or to producers and provincial governments. (43)

The A.C.S.E. recommendation is not adopted here for the following reasons:

- (1) A net present value calculation for trucking costs necessarily incorporates forecasts of such highly variable items as the world price of petroleum and the general level of interest rates;
- (2) With the passage of time, the positive feelings engendered by one-time-only payments diminish rapidly, and the original

amounts tend more and more to be derided as patently inadequate in the light of subsequent developments;

- (3) One-time-only payments to producers would not provide a convenient tax-base from which provincial governments would feel confident of recovering what was needed to cover higher road costs extending forward through time.

The entire trucking and road-cost aspect of the proposed scenario here could, of course, be immensely simpler if only the present structure of provincial license fees and fuel taxes in the prairie provinces were such as to recover from road users all or most of the marginal road costs of increased grain trucking. But the actual structure is very far from being capable of doing that, and it is unrealistic to suppose that the governments concerned would be prepared to change radically and rapidly these long-established structures (major parts of which of course apply to many road-users in addition to grain haulers). Particularly is it unrealistic to suppose that these governments would be prepared to impose, or even just to appear to impose, net new tax burdens on farmers at a time when so many of the latter are experiencing such hard times in other respects.

That is why the system of trucking credits outlined here is designed to make a clearly defined new payment to farmers from which provincial governments may deduct tax, and still leave farmers unambiguously better off than they were before, thanks both to net trucking credits and lower rail rates. There is no magic about this: its source lies in

transport system efficiency-capture, in which provinces are here given some opportunity to participate.

Questions are also likely to be raised about compensation for Community Redevelopment. Many question both the justification in principle for such compensation, and the real extent of the problem, given how much else has already happened to the sorts of communities likely to be losing elevator business and tax assessment in the above modernization scenario. The A.C.S.E. paper examines and rejects this type of compensation on the grounds that there is no precedent for it -- that compensation of this type has not generally been paid in Canada for losses occasioned by the departure from communities of industries such as grain elevators and grain-dependent branch lines. (44)

Let us set up the question herein our own particular way, then provide a two-part answer to it, plus some further elaboration. First, the question: Would not the losses experienced by these prairie communities simply be one of those "prices of progress" which, in other contexts, have more often than not failed to be compensated? And would not the compensation proposed here amount to an equity-for-efficiency tradeoff, whereby the incentive for system-modernization would be weakened?

The first part of the answer is that government policy to date with respect to many of these communities, notably the protection of certain branch lines to the year 2000, has encouraged them to entertain an expectation that they would keep their elevators and branch lines for a considerable time into the future. Second, no reader of briefs to CTC

hearings and other relevant background documentation can fail to escape an impression that fear of uncompensated loss of branch lines and elevators has put significant political pressure on governments at all levels not to push ahead strongly with system modernization. The cost of that -- much of it borne by the collectivity of prairie grain producers -- has been transport improvements and savings delayed.

One can relate this to a more generalized picture of how technological change tends to be handled in the Canadian economy. At all times, there is somewhat abstract, generalized talk among economists and others about the desirability of helping people to adapt to technological change. When a given technological change is actually imminent, however, financing of adaptation is usually rejected as too inflative of budget deficits and industrial costs. Instead, for the most part at least, the projected victims of the change are invited to be economic realists and lie down in front of the oncoming juggernaut. Being, however, independent-minded Canadians, and political realists who know that they have votes, they often refuse to do this. Instead, they stand up and fight the juggernaut, often delaying it considerably, and so putting Canada further behind in the world-wide technological race. How the cost of this mode of proceeding might compare with the cost of timely financing of human adaptation is a question rarely asked.

So far as small prairie communities are concerned, it is of course necessary to see matters in the earlier-mentioned perspective of the enormous changes that have already occurred to these communities -- above all, as a consequence of the provision of all-weather roads.

Compared with these already accomplished changes, the loss of the direct and spin-off economic benefits of one or two smaller-capacity elevators does not, at least on the face of things, bulk so large. It must be asked, too, what are the spin-off benefits of elevators these days? As one interviewee put it, "A farmer doesn't go shopping in his grain truck. He shops with his family in his half-ton. When he's trucking grain, you're lucky if he stops in for a cup of coffee." Some purchases of fertilizer and other agricultural supplies from the elevator may also occur. But the horse-and-wagon days, when a round trip from farm to the nearest town might take a full day, so that it economized importantly on time to combine grain hauling and general shopping, are clearly far behind us.

Nevertheless, it would be unwise as well as improper to try to wave away the above-mentioned loss to small communities as too trivial to be worth bothering about. It is not trivial to those expecting to feel it, and any expectation that communities much above hamlet size harbouring these feelings will in any case soon be phased out altogether by the irresistible tide of economic progress ignores a lot of hard-learned evidence from other parts of Canada. It once seemed rational to the government of Newfoundland, in Premier Smallwood's time, to consolidate many small outports into larger, more economic units, thus in effect killing off a lot of outports. In the event, some economic activities such as fish processing became consolidated, but rather few outports expired. As new roads spread along the coastline, many Newfoundlanders opted for continuing to reside in their native outports, and driving 50 or more miles to work when it was available. A somewhat similar experience occurred in the Gaspé and Lower St. Lawrence region of Quebec.

Especially given the resource-base of much of the economy, it is striking how few communities completely die in Canada. We have remarkably few genuine ghost towns.

A key fallacy here may be to suppose that because the original reason for the appearance of a small town was an economic one of a particular nature, the reasons for its continuance remain the same. Once created, communities acquire a certain life and momentum of their own. And it may even be that where a community was created by unusually hard and patient work in the face of a somewhat harsh natural environment, the sense of loyalty to it among its hard-core resident families may be so much the greater. It is quite possible to meet westerners strongly in favour of modernization of the grain transport system who at the same time prefer to maintain their own family residences in small communities.

In any event, what we seem to have on the prairies is a de facto government policy not to let these more-than-hamlet communities wither too much. This is unmistakeably implicit in present government attitudes towards grain transport, among other things.

This being the case, the implicit policy should be brought out of the closet and made explicit. That will then permit us to ask the right question, which is, "What is the best -- the most cost-effective way -- to help these communities?"

There are numerous answers to that question, the answers of course varying with the circumstances of particular communities. But in most

rankings of possible answers, desperate attempts to hold on to lightly used elevators and branch lines -- which even now, without multitar freight rate discounts, are tending to lose elevator business because of changes in elevator economics -- would rarely place high. Much better possibilities would seem to lie in reinforcing the convenience-centre, and in some cases dormitory-suburb, functions which these communities have tended to assume. The proposed Community Redevelopment Compensation would provide resources with which to do this.

One awkward feature of the proposed compensation package is not dealt with here. This arises from the fact, noted earlier in this chapter, that considerable modernization of the prairie grain-gathering system has already occurred, chiefly through the process of elevator consolidation. This has occasioned longer truck hauls for many producers, and loss of elevators for many communities.

If, against this history, we were to introduce some form of compensation for future lengthenings of truck-hauls and losses of elevators, it might be expected that objections would be heard from earlier, non-compensated losers by modernization. This would pose a considerable dilemma. The purpose of the proposed future compensation payments would be to accelerate future system modernization and its associated cost-savings, financing the compensation payments by a small percentage levy on the cost-savings realized. But the mind boggles at the idea that this could all somehow be "backcast" -- that past "winners" and "losers" from past modernization could be identified, and that appropriate monetary transfers could be arranged.

Yet a nagging case in equity would persist. Perhaps the political system would prove equal to the challenge, as by making small "grandfathering" payments in aid of road improvements and community redevelopment to certain municipalities identified as having been particularly affected by elevator consolidation in the recent past.

CHAPTER II - SOME ROUGH STATISTICAL MAGNITUDES AND RECOMMENDATIONS FOR BETTER FUTURE DATA

In order to be made operational, the modernization program for prairie grain transport and handling set forth in the previous chapter would make major demands for statistical data. This data would be required, first, to establish with reasonable assurance that the total savings for the system would be large enough to make the exercise worth while. Second, data would also be required at the local or "Grain District" level, to enable the disclosure to local grain producers and other interested parties of reasonably reliable estimates of the gains and costs to them of system modernization. Finally, data would be required at both the system and the local levels to judge and calculate appropriate levels of the compensation payments that have here been recommended. Among the justifications of these payments would be as an incentive to earlier capture of the cost-savings of system modernization.

There already in fact exists a substantial body of good data bearing on the problem under examination here -- certainly enough to suggest to well-informed observers that major cost-savings are available. At the outset of the research on which this report is based, it was thought that enough such statistics existed that, if pulled together, they might make the case for modernization convincingly to a broader public. It was thought also that they would permit at least a first, rough estimate of "wins", "losses" and appropriate compensation payments.

But these judgments proved over-optimistic. Though often highly interesting, the available data measured at once too much and too little. It measured too much in the sense that the different bodies of data too much overlapped with each other, giving rise to serious double-counting which it was virtually impossible to eliminate. It measured too little, in the sense that no one of these bodies of data really captured all of the more important savings that an unusually interactive system would generate, once it was subjected to a major new thrust of modernization.

It is, however, possible to foresee how, with the use of the PHAER grain transport research model, developed in the Research Branch of the Canadian Transport Commission, these difficulties could be largely overcome. Recommendations to this effect form the latter part of this chapter.

First, though, it is useful to scan four of the major bodies of data presently in existence for some of the numbers which they throw up. It is helpful to have a rough base against which to relate these numbers. In the 1982/83 crop year, some 33.1 million tonnes of prairie grain moved from farm to export positions at Thunder Bay, Churchill and the Pacific coast ports. Total transport and handling charges for this movement were estimated at \$31.37 per tonne, giving a total cost of just over one billion dollars (1). Judging by its verbal use at a recent grain transport research workshop in Winnipeg, this rough order of magnitude commands a certain acceptance among people knowledgeable in the field (2). Thus, as a base against which to measure in percentage terms potential system savings, the \$1 billion number will perhaps serve well enough for now.

The Kruger Unit Train Estimates

In a study for the Canadian Transport Commission (3), Joseph Kruger has estimated the system savings that would result simply by substituting for the conventional grain train services actually provided in 1980 "unit train services based on a hypothetical profile of potentially feasible services".

(4) Only railway variable costs were included. The saving in these was estimated conservatively at about \$58 million per year.

As the study itself points out, this figure leaves out of account a number of important adjunct savings which it was impossible to estimate with sufficient precision within the time-frame of the study. For example, potential, non-variable, "line-related" costs were not included. Since these were estimated to have amounted to about \$100 million for CN and CP in total, (5), and since many of these occurred along branch lines, and could be expected to disappear as the unit train operations brought about a concentration of delivery points, and a consequent abandonment of much high-cost branch line trackage, important additional savings could be envisaged here.

Also excluded were savings in equipment costs. These, too, would almost certainly be important, inasmuch as Kruger's figures indicate a spectacular increase in rates of car utilization, reflecting the higher average speed and much faster turnaround times of unit trains. This would lead to major savings in new-equipment purchases.

Greater use of unit trains would imply greater concentration of elevator capacity in high-throughput units. While this would involve substantial capital investment, that investment would be amply self-justifying in terms of much reduced handling cost per elevator.

On the other side of the ledger, truck-haul distances, and consequently trucking and road costs, would be higher; but all the information we have on these (6) suggests that they would be far more than offset by the other additional savings mentioned.

Taking all these further matters into account, we may forecast with some confidence that Kruger's figures for unit trains would be consistent with annual savings of much more than \$100 million a year (10 per cent of total transport and handling costs).

The High Cost Branch Line Study

The High Cost Branch Line Study of the A.C.S.E. Working Group (7) give us another clue to the order of magnitude of savings which might result from a more major thrust towards system modernization.

At the heart of the A.C.S.E. study is an investigation of a particular grain-dependent subdivision (real, but unidentified; the information was supplied in confidence by one of the railways) which had a traffic density in 1983/84 of 1,180 tonnes per mile. This put it near the top of the bottom quartile of western subdivisions in terms of traffic

density. In other words, almost 25 per cent of subdivisions in western Canada carried a lower grain traffic volume per mile than did this one. (8)

Looking only at rail and trucking costs, the total annual cost of retaining this subdivision ("branch") in the system, "as is", was estimated at \$6.04 million. The cost of completely abandoning it, and trucking grain further to still-operating subdivisions, was estimated to be \$4.17 million, for a net saving of \$1.87 million. The reduced railway costs are said to have dominated the calculation; increased trucking costs were small by comparison.

Now let us perform a very rough experiment. At the time of the study, there were 188 subdivisions in western Canada. One quarter of them, or 47 subdivisions, would have fallen into the lowest quartile in terms of grain traffic density. If all of these 47 subdivisions were abandoned, and if the average saving per abandonment were the same \$1.87 million figure that the A.C.S.E. group estimated for the particular subdivision they examined, the total saving could be calculated at $47 \times \$1.87 \text{ million} = \$87.9 \text{ million}$.

There are three major reasons why this total saving figure might be deemed "too large". They are:

- (1) The particular subdivision examined by the A.C.S.E. group was just over 100 miles in length, compared with an average subdivision length of 37 miles (roughly 7,000 miles of grain-related lines, divided by 188 subdivisions, some quite

short)(9). This might have made for higher-than-average line-related costs for the sample subdivision;

- (2) Some of the subdivisions in the bottom quartile might have been so lightly trafficked that both their annual costs and the opportunity to save costs via abandonment were less than in the case of the sample subdivision;
- (3) Some allowance should be made for the favourable impact on the unit costs of non-abandoned lines of diversion of grain from abandoned lines.

On the other hand, there are respects in which the "total savings" figure calculated in this very rough and ready way might be judged "too small". They are:

- (1) Most importantly, the savings were calculated only in terms of rail branch line costs and trucking costs, using the existing equipment. There was no allowance for economies in main-line rail operations (which would benefit from the ability to assemble longer main-line trains at fewer points), or for economies arising from higher average throughput at the fewer elevators remaining in the system;
- (2) There was no allowance for any tendency to use higher-capacity, lower-unit-cost trucks as a reaction to greater average length of truck-haul;

(3) In a full-blown modernization scenario, more than the lower quartile of low-density branch lines would almost certainly be abandoned. Additional estimates contained in the A.C.S.E. Report (10) indicate possibilities of large further savings amongst lines in the higher quartiles.

Offsetting the "too large" factors against the "too small" leads to a judgment that, in the event of a major abandonment of high-cost branch lines, total savings in all aspects of the interactive system would surely be well in excess of \$100 million per year.

The IBI Estimates

The most comprehensive estimates presently available of savings from system modernization are contained in the IBI report on trucking in the grain industry (11). While the principal focus of the report is to calculate grain trucking costs in relation to three different future delivery-point scenarios (920, 800 and 650 points, compared with 1,181 points in 1983), many, if not all, of the rail and related economies that would occur in association with a consolidation of delivery points are also estimated. Use is made of the PHAER model to calculate changes in length of truck haul.

Let us focus particularly on the 650-point scenario. This, it is estimated, would generate economies of between \$4.00 and \$5.00 per tonne. (12) If we take the 1982-83 crop of 35.8 million tonnes, extract the 33.1 million tonnes of it that moved to "export positions" (including Thunder Bay, although of course some grain moving to that point is in fact processed and

consumed in central and eastern Canada), and multiply by a factor of \$4.50, we arrive at a total estimated saving of \$149 million dollars.(13).

This figure gives good coverage of truck and primary elevator costs, and related scale economies. It also covers some, but not all, of savings in railway costs. This aspect is explained as follows:

"It should also be noted that the rail costs shown in Exhibit 5.9 assume that the \$3.00 per tonne rebate for multiple car operation represents the total savings in railway costs. It has been asserted by the railways and others that the operating costs on many branchlines are much more than \$3.00 per tonne higher than the average. Thus, if such a reconfiguration of the system can be achieved there may be much larger railway operational costs savings, not to mention additional savings of the capital costs for branchlines included in the rehabilitation program but not yet rehabilitated."(14)

This statement regarding branch line costs seems amply confirmed by the A.C.S.E branch line estimates.

We thus have a savings figure which, though more comprehensive than others, appears significantly conservative in two respects. First, it omits some important branch line savings. Second, it still leaves in place (see the map on page 107 of the IBI report) a substantial number of branch lines

and delivery points which would be redundant were there to occur a more general use of unit trains for most rail haulage of grain.

Another specially useful feature of this study is its inclusion of estimates of job gains and losses in the event the 650-point scenario were implemented. These are:

		Additional	Net Total	Net
(a) Commercial Truck Drivers	(b) Terminal Operators	(c) Indirect Jobs	(d) Direct and Indirect Jobs	(e) Overall Employment Change*
163	-520	295	(a+b+c) -62	-124

* After application of "multiplier factor" of 2.

Source : IBI, p. 136.

In the above table, "terminal operators" means country elevator operators. "Indirect Jobs" means jobs on the prairies created by additional trucking, such as truck fuelling, service and maintenance, and trailer manufacturing. Loss of railway branch line jobs is not included both because it is difficult to estimate and because it is believed to be small. Generally, the net job loss figure is striking by its smallness: much of it could probably be met by attrition, and by early retirement or other compensatory payments up to a relatively small total. This portion of the report also contains a useful survey of various studies of economic impact of rail branch line abandonment on small communities. The point made earlier in the present report, that by far the major impact on such communities has been

that occasioned by the spread of all-weather roads and changed shopping habits, rather than by elevator and branch line closures, is reiterated.

Canada/U.S. Comparisons

In seeking to establish possible cost savings from modernization of the Canadian grain transport system, it would be most useful to be able to run valid cost comparisons between the Canadian system and the more modernized United States system. Unfortunately, data do not exist to do this properly at the present time. A major complication is the proliferation of modal and routing alternatives in the United States, as compared with Canada.

Some work by Fruin and Dickerson (15) does, however, indicate that low barge rates on the Mississippi River (from time to time matched by north-south railroads using unit-train technology) would make it economical to divert the shipment of substantial quantities of Canadian export grain from the Thunder Bay/St. Lawrence route to the Mississippi/Gulf of Mexico route. The amount of diversion projected depends on the assumptions made about barge rate levels, and to a lesser extent about other matters.

Since the variable cost of all rail movement in this scenario, on both sides of the border, is calculated at U.S. unit-train costs, the exercise does not tell us anything about the savings attributable to greater use of unit train technology in the United States than in Canada. It does, however, underline the competitive advantage which the availability of the Mississippi route gives to U.S. grain producers relative to their Canadian

counterparts. This in turn points to the urgency of getting the real cost of Canadian grain transport and handling down to as low a level as possible.

To run a full-scale comparison of all grain transport and handling costs in Canada and the United States would be a formidable and expensive undertaking. Before anything on this scale is contemplated, it is recommended that we await the appearance of a doctoral dissertation on the Great Lakes and Mississippi routes now under way in the Department of Agricultural Economics at the University of Manitoba. This dissertation, by Mrs. Pam Miller, under the supervision of Professor Arthur Wilson, may prove to give us a fuller picture than we now have of comparative costs above and below the 49th parallel.

The Present State of the Numbers

What do the foregoing sections of this chapter tell us about the "ballpark" within which total cost savings from a thoroughgoing modernization of the Canadian system might lie? Certainly the figure must be well above \$100 million per year. The IBI study, which picks up more of the elements of the system and their interactivity than does any other, produces an estimate considerably higher than that level. If it picked up more of the rail branch line savings which its 650-delivery-point scenario implies, it might well generate a figure in excess of \$200 million, by comparison with its present savings figure of \$149 million.

In other words, we might do well to think in terms of possible savings of more than \$200 million, or more than 20 per cent of total

transport and handling costs (16). Especially in the present world buyers' market for grains, that would be an advantage for producers and others well worth having.

But to be sufficiently persuasive to set in motion a fuller and more rapid process of modernization than is currently occurring, we need more than rough, total-system "guesstimates", even from well-informed sources. What we need, in well-documented form, are:

- (1) Reasonable estimates of total system savings from modernization under two or three alternative delivery-point scenarios;
- (2) Local, district-by-district estimates of benefits and costs arising from different delivery-point scenarios.

For these estimates to be sufficiently trustworthy for the purposes in mind, it is essential to recognize that we are dealing with a highly interactive system, involving the four principal elements of, (1) truck movement, (2) elevation and related services, (3) rail branch line movement and (4) rail main line movement. At some later stage, port terminal activities should also be incorporated.

Modernizing changes in any one of these four elements have significant implications for all of the other three. For example, the consolidation of country elevators presently under way in western Canada, in addition to achieving economies in elevator operations, is also reducing rail costs for set-outs and pick-ups of grain cars to a degree that almost

certainly much more than offsets the associated higher cost of longer average truck hauls.

By way of a second example, if a more deliberate process of abandoning high-cost, grain-dependent branch lines were instituted, that would accelerate elevator consolidation and the capture of associated elevator operating economies. It would again reduce rail set-out and pick-up costs. Moreover, if vigorously pursued, it would so concentrate deliveries at some high-volume locations that the railways could introduce unit-train line-hauls to major ports at a substantial cost-saving.

For a final example, let us suppose that the Canadian railways, having been granted the right to offer quantity discounts on grain in the form of so-called "variable rates", follow U.S. examples and begin quoting discounts of, say, 18 per cent on 52-car lots moving from Saskatchewan to the Pacific coast. We would then expect to see the unit train economies that motivated the offer of lower rates in the first place, plus further cost-savings through accelerated elevator consolidation and branch-line abandonment.

In all of the three examples given, there would, of course, be partially offsetting increases in trucking costs to be factored in, plus new investments in elevators, longer rail sidings, etc.

No matter how it is initially triggered (and it could, of course, be triggered in more than one way), any modernization of the western grain transport system that we can reasonably envisage sets a complexity of

distinct elements into motion. It is this feature that cries out for the use of a large, computerized model. There is no other practicable way of estimating so many variables potentially in motion at the same time.

The PHAER Model

Fortunately, there does already exist a model possessing some of the characteristics we most need. That model is the PHAER model, developed in the Research Branch of the Canadian Transport Commission. The PHAER acronym stands for, "Producer Haul and Elevator Receipts" (information system).

In the beginning, PHAER was designed, "primarily to examine the effect of potential delivery point closures on grain producers and on neighbouring delivery points." (17) Its primary data base consists of annual summaries of grain deliveries organized by farmland of origin (there is an adjusting mechanism for where a farmer crops land in two or more separate localities), and by delivery point.

"Originally, the idea was to estimate producers' truck haul to alternative grain delivery points." Subsequently, elevator effort was incorporated and in 1976 an algorithm for rail cost elements as well as the actual rail tariffs (at that time, the Crow Rates) were added."(18).

What this means is that, having pre-specified some possible future

line abandonment, or on some interaction of both), one may obtain from the model predictions of the resulting cost changes.

First, as to trucking, the model assumes that when a delivery point is taken out of the system, farmers will truck to the nearest alternative delivery point still open. In reality, because of features of delivery points other than physical nearness, farmers will not always do this; but tests indicate "nearness" to be a sufficiently dominating influence that this PHAER assumption is a "realistic and satisfactory approximation".(19)

In its normal mode, PHAER then converts trucking distance into trucking cost based on regularly updated estimates of average cost of trucking in a typical farm truck.

Country elevator costs under, respectively, the existing and the new pattern of delivery points, are then calculated within the model, based on externally supplied information about costs at a sample of prairie elevators. Where diversion of grain appears likely to overstrain capacity at "nearest alternative" delivery points, the system flags these points so that the user can take into account the elevator capital costs necessary to correct the situation.(20)

Finally, costs of rail shipment to the nearest export port are estimated. The rail haul is broken down into branch line and main line components. Then appropriate cost factors, derived from annually updated

For our purposes here, it is important to note PHAER's ability to generate a supplementary set of reports through programs know as "PHAER-EXTENTION". First, these reports permit comparisons to be made between present and future delivery-point scenarios, taking into consideration all of trucking, country elevator and rail costs. Second, trucking costs may be recalculated on the assumption that under the new scenario, larger and more efficient trucks will be used. At present, this yields results only at the system-wide, aggregate level. It would, however, be possible to alter the model so that the lower unit costs of the larger trucks "kicked in" on a locality-by-locality basis, as longer distances were judged to warrant the switch to larger equipment. Correspondingly, the results of this could be displayed at the local as well as the whole-system level.

Third, elevator throughput ratios are predicted, thus giving a primary indication of potential gains in elevator efficiency under the future delivery-point scenario. (21)

In addition, on-going work with the model is increasing its capabilities still further. Work on trucking costs will permit analysts to compare private, "self-haul" trucking costs with the costs of hiring custom and commercial truckers using complex, heavy-duty equipment. Enlargement and greater detailing of the sample information of elevator costs should in due course make it possible for the model to incorporate cost-savings from scale economies and throughput economies in the operation of elevators.

comparisons of the costs of conventional and unit trains in line-haul service. It is understood that the lower cost of unit trains could be introduced into the extended PHAER model whenever predicted delivery volume at one point, or a few nearby points, rose to a level deemed to justify unit train use. Development of this feature would involve considerable work, probably best done manually in the first instance, then "inputted" into the main model.

Finally, work is going forward to bring within the ambit of PHAER such matters as marine, port, transfer and terminal elevator costs.(22)

Summing up, it is stated:

"The ability to produce an overall picture of the impact of (recently enacted) measures on activities such as grain elevation, railway services, networks, revenues, costs and subsidies will enable the participants in the system to identify and pursue improvements in the grain collection system and to minimize possible negative effects. In order to measure fully the impact of changes brought about in grain handling and transportation, PHAER provides the needed degree of integration of information and analysis on the entire system."(23)

above all its integrative capacity -- its ability to keep all the principal elements in the system in play without double-counting -- that renders it invaluable in the present context.

A first, obvious recommendation is that, within the general restructuring of transport functions in the federal government now under way, the PHAER model and its research support team be kept together, so that development of the model and the increase in its usefulness may continue. Also imperative is to continue the publication of studies based on the model, partly with a view to improving general knowledge of it and its capabilities in the transport research community. It is the author's impression that while some western academics have made very fruitful use of the model, its capabilities are not as well known as they should be in some other quarters. Wider use of PHAER would improve networking between transport researchers, and also have a tendency to increase the use of common and compatible data bases, and the voluntary exchange of data. A difficulty here is that, for commercial/competitive reasons, some suppliers of data, such as the railways, wish to restrict access to some of their information. While this desire is understandable, against it must be set the advantages that would be gained if everyone engaged in grain transport research could work in terms of a widely agreed set of numbers relating to, e.g., branch line costs.

More specifically, it is recommended:

(1) That the prairie growing region be divided up, along Hall

Commission lines, into "Grain Transport Improvement Districts"

(2) That there be carried out a more elaborate and fully developed version of the exercise reported in the 1985 CTC Working Paper, Effects of Reduction in Grain Delivery Points on the Canadian Prairies.

(3) That there be generated through this exercise (which would incorporate estimated scale economies in rail and elevator operations) cost estimates both for the total system, and for each Grain Transport Improvement District. These estimates would be generated in terms of the present network of delivery points, and of possible future networks of 650 and perhaps also 300 delivery points. (The 650-point scenario is within PHAER's present physical capacity; going to 300 points would involve appreciable new expenditure, but looking ahead ten or more years, the extra information might be well worth the cost). The geographic structure of these networks would initially be generated outside the model by suitably well-informed persons, then supplied to the model as input. It might be well to generate three different sets of delivery points for each total number of points. This would make clear that neither the model itself nor the people operating it were making any final recommendation on the inevitably controversial question of which particular communities might become the selected heavy-duty delivery points. It would likely also demonstrate that the selection of particular communities made little difference

All this, even if it were limited to a 650-point scenario, would be a considerably more expensive operation than any previously carried out with PHAER. Yet, having regard to the fact that transport cost savings on the order of some hundreds of millions of dollars are at stake here, the expense would almost certainly be well worth it. Governments and the general public must have before them better estimates than those now available of the total cost savings in prospect, as an incentive to the major political effort necessary to capture them. And we have also to be able to address knowledgeably benefits, costs and associated possible adjustment assistance at the district level.

Some additional data, not presently available through the PHAER model, would be well worth having for our purposes here. Some of this data might be incorporated within the model; some might better be generated outside it. The data are as follows:

(1) Incremental road costs arising from increased grain trucking under different delivery point scenarios. The numbers here may not prove to be all that impressively large (in part because as length and time of hauls increases, drivers will tend to select heavier-duty roads on which they can make better speed). It would, nevertheless, be very useful to have this data --if only, initially, on an average basis (in reality, road costs could vary considerably from district to district, depending on such factors as the relative prevalence of thin, fragile pavement, gravel,

that might much reduce the present opposition of provincial and municipal governments to increased grain trucking;

(2) An optional "kick-in" feature in or adjacent to the PHAER model, analogous to that already practicable in respect of rail unit trains, such that as trucking distances lengthened, unit-cost savings from increased use of higher-capacity, lower-unit-cost truck could be factored in;

(3) A break-out of labour costs from other costs in the model, so that labour cost data could be used to calculate employment and local income impacts of future delivery point scenarios. The usefulness of this would be the approximate knowledge it would give of how many people, and where, might lose their jobs. In the light of that, "grandfathering", attrition and other strategies might be considered to lessen opposition on the score of job loss.

(4) Rough estimates of community income impacts of elevator closures and branch line abandonments, the estimates of course varying with the amount of grain presently handled. Then if adjustment assistance on this score, as recommended in this report, were deemed worthy of consideration, the total costs of it could be calculated. There already exist some models and estimates, based on past experience of the impacts in question here, and these, or adaptations of them, could be put to good, predictive use. (24)



CHAPTER III - CONCLUSION

It may be helpful to put this paper in context with certain earlier documents covering all or part of the same subject-matter. As compared with such documents such as the Hall Commission Report, and the McDonough Report on branch lines (1), it is framed in terms of a much longer, more radical step forward in the modernization of the western grain transport system. With the advantage of more hindsight, and of more information about what has proven possible in the corresponding system in the United States, the view taken here is that we would be unwise to devote much attention and investment to a sort of half-way house system, with facilities of size and type unable to capture more than a part of the cost-savings potentially available. We should take a longer step forward into the world of unit trains, high-throughput elevators, and more extensive and efficient trucking networks. To be able to make that step soon, it will be worth our paying a fairly substantial price in terms of adaptive and compensatory assistance.

As compared with the A.C.S.E. paper (2), the chief difference is that this document tries to embrace a full range of possible system efficiency gains, rather than concentrating on the branch line aspect only (which of course the A.C.S.E. group's terms of reference compelled it to do). It also puts forward a perhaps more practical scheme for handling compensation for extra trucking and related road costs.

On the other hand, the A.C.S.E. paper contains a wealth of useful

representatives of various system participants in the west, that will not be found here.

In relation to all this, it is evident that a stage of research has been reached where considerably more statistics are required. We must have a better sense of at least some of the general orders of magnitude likely to be involved in system-wide modernization, and of how the costs and benefits will look at the local, "District" level.

Even if no new policy initiatives are taken, the prairie grain transport and handling system will not stand still. La force des choses -- including notably the need of the elevator companies to achieve further economies in their operations -- will produce a good deal of modernization in any event. But modernization is likely to be more rapid, coherent and fruitful if other parties, including notably the railways, are enabled to play a fuller role in the process from this point onwards.

Finally, let us reiterate a fundamental point made earlier. Looking well ahead, as one should in "next year" country, it is apparent that the greatest ultimate gainer from transport system modernization will be the prairie grain grower. He faces both a tough world market and a long haul to access that market. The basic purpose of this paper has been to explore ways of cheapening his haul and so improving his "netback" and competitive position.

Appendix A

SUBSTANTIVE TERMS OF REFERENCE

Purpose: This study is concerned with establishing a methodological framework to evaluate the potential local, regional and national socioeconomic impacts of a transition in the handling of grain if it were to be transported to export gateways by unit train instead of the present (carload) system.

Methodology: Through a process of interviews, literature searches and analysis of available data, establish a framework for evaluation of social and economic impacts.

Draw on public choice theory and other relevant branches of economic analysis and establish a methodology to examine the likely costs and benefits, both economic and social, to the various groups and institutions which may be directly or indirectly affected by change in the transportation of grain.

Activities: 1. Identify the various players (parties, groups, institutions, etc.) presently involved in the production, marketing and transportation of grain in Canada, and their respective roles.

3. Identify the social and economic costs and/or benefits evolving from such a technological change over a period of time.
4. Identify where the parties involved in the present system of grain transport and handling could continue to play a useful role in the new system, where this is not likely to be the case, and where adjustment assistance or some other compensation could be provided to smooth the transition from one system to the other.
5. Establish a way to assess the cost-jobs-incomes profile of the existing grain transport and handling system compared with a similar profile of the new system.

At this point in the contract, in the light of experience, and through exchange of letters -- see D. McQueen to J. Kruger, dated September 12, 1986, and D.F. Smith to D. McQueen, dated September 30 1986 -- the original remaining terms were altered to read as follows:

6. To develop a rough estimate of the total system saving that might be achieved by a thoroughgoing modernization of all four principal elements of the western grain transport and handling system.

modernization in terms of specific groups of "winners" and "losers", and also in terms of local areas in western Canada.

Study Output: Provide report and whatever technical appendices are necessary to document the above steps, concentrating on the public choice theory methodology and its application in the test situation, and on how the methodology would be used in comparable situations.

END-NOTES FOR CHAPTER ONE

- (1) For fuller terms of reference, see Appendix A.
- (2) Veeman and Veeman (1984), p. 55. The estimate of \$1 billion for transport and handling costs is a "guesstimate" by the sources. It can vary considerably up or down, depending on what marginal items one chooses to include or exclude.
- (3) ibid., p. 10.
- (4) ibid., p. 115.
- (5) ibid., p. 33.
- (6) Whether any of the basic "Crow benefit" should be paid to the producers rather than the railways is an interesting question not discussed here, where there is already material enough to preoccupy us.
- (7) See, e.g., A.C.S.E. (1985), Kruger (1984), Norrie (1983), Reed (1985), Schweitzer (1984), Sparks (1985 - I and II), Tyrchniewicz, Butler and Tangri (1971), Tyrchniewicz, Moore and Tangri (1974), and Waters (1985).
- (8) Kruger (1984).
- (9) IBI Group (1985), p. 96.

- (10) CP Rail, Ranking of Prairie Branchlines Based on 1984 Train Run Line and Gathering Costs, Winnipeg: "The Grain Team", CP Rail, One Lombard Street, 1986.
- (11) Tyrchniewicz, Moore and Tangri (1974), p. 2.
- (12) ibid., p. 2.
- (13) Stabler (1985), pp. 4-5 to 4-22.
- (14) A.C.S.E. (1985).
- (15) ibid., p. i. Sparks (1985 - I) gives further estimates for rehabilitated lines.
- (16) A.C.S.E. (1985), p. 36.
- (17) ibid., p. i.
- (18) IBI Group (1985), pp. 83-87.
- (19) IBI Group (1985), Clayton, Nix and Sparks (1984), Tyrchniewicz, Butler and Tangri (1971), and Tyrchniewicz, Moore and Tangri (1974).
- (20) Tyrchniewicz, Butler and Tangri (1971), p. 70.
- (21) Hiebert ().

(22) Veeman and Veeman (1984), p. 101.

(23) ibid., p. 102.

(24) Account should be taken, however, of the maintenance of the Mississippi waterway by the U.S. Army Corps of Engineers.

(25) Rodriguez (1985), pp. 17-18. For an earlier, more qualified opinion, however, see Griffin and Mielke (1982).

(26) Eldridge, Fruin and Alley (1982), pp. 13-15.

(27) See Norrie (1983).

(28) These hearings concerned an application for rate reductions by Northern Sales Company Ltd. and Cargill Grain Limited and CN Rail, pursuant to section 45(1)(a) of the Western Grain Transportation Act. After a period of hearings by the Canadian Transport Commission in Saskatoon in 1985, the application was withdrawn.

(29) Eldridge, Fruin and Alley (1982), pp. 2-7.

(30) Fruin and Dickerson (1985), p. 379.

(31) For a good general survey, see Mueller (1979).

(32) See Norrie (1983).

(33) A.C.S.E. (1985).

(34) ibid., p. 30.

(35) Canada Grains Council (1982), p. 22.

(36) See Gilson (1982) p. VI-1, and Western Grain Transportation Act (1983),
sec. 18(1)(e).

(37) A.C.S.E. (1985), p. 9.

(38) IBI Group (1985), pp. 36 and 59-62.

(39) A.C.S.E. (1985).

(40) Gilson (1982), p. VI-1.

(41) Hall Commission (1977), esp. vol. 3.

(42) See A.C.S.E. (1985), p. 16 and Appendix 8.

(43) ibid., p. 19.

(44) ibid., p. 19.

END-NOTES FOR CHAPTER TWO

- (1) IBI (1985). pp. X-8 and 2, 3.
- (2) University of Manitoba Transport Institute Workshop on Grain Transportation Research, Winnipeg, September 8-9, 1986.
- (3) Kruger (1986)
- (4) Ibid., p. 3.
- (5) ibid., p. 30.
- (6) See IBI (1985).
- (7) A.C.S.E. (1986)
- (8) ibid., p. 33.
- (9) ibid., pp. 32-33.
- (10) ibid., pp. 36.
- (11) IBI (1985).
- (12) ibid., pp. 2-3.

- (13) The crop figures are from ibid., p. 123.
- (14) ibid., p. 118.
- (15) Fruin and Dickerson, 1985.
- (16) This figure again was verbally cited at the University of Manitoba workshop (see note 2 above) without exciting dissension.
- (17) Canadian Transport Commission (1985).
- (18) ibid., p.2.
- (19) ibid., p. 7.
- (20) ibid., p. 9.
- (21) ibid., p. 9.
- (22) ibid., pp. 17-20.
- (23) ibid., p. 1.
- (24) See Underwood McLellan and Associates Ltd. (1972); Olsen and Brown (1975); and Stabler (1985). The general discussion of this matter in the Hall Commission (1977), vol. 1, pp. 75-84, is also helpful.

END-NOTES FOR CHAPTER III

- (1) "Hall Commission" (1977), and "McDonough Report", 1985.
- (2) A.C.S.E. (1985).

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